

Research on the Effectiveness Identification of Novel Reader Comments Based on BERT-Attention Mechanism

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ABSTRACT

With the rapid rise of generative artificial intelligence (AI) in the field of literature, online literature reviews have surged, but issues such as difficulty in filtering effective information and inconsistent standards have emerged, posing challenges for reader feedback extraction and content optimisation. Accurately identifying the core valuable information in novel reviews is of significant importance for the construction of the online literature industry ecosystem. This paper focuses on the specific scenario of novel reader reviews and explores the application of the Bidirectional Encoder Representations from Transformers (BERT)-attention mechanism in identifying their effectiveness, using literature research, inductive and deductive methods, and comparative review methods to provide an overview. The study clarifies the criteria for defining effective information in novel reviews, analyses the contextual adaptation bottlenecks of existing technologies, and ultimately constructs a theoretical framework suited for this scenario, providing theoretical support for the implementation of review analysis technology.

Keywords: BERT, Attention Mechanism, Text Analysis, Effectiveness Identification, Novel Reader Reviews.

1. INTRODUCTION

In the field of text analysis, the academic community has achieved abundant research results on the integrated application of BERT and attention mechanism. Hu et al. ^[1] conducted research on the application of public opinion classification based on the BERT model, laying a foundation for text classification tasks. Chen et al. ^[2] verified the effectiveness of combining BERT and bidirectional Long Short-Term Memory (LSTM) in the orientation analysis of Weibo comments, confirming the advantages of the fusion model in social comment texts. Relevant foreign studies have systematically optimized BERT in terms of model structure improvement, function expansion and scenario application ^[3-5]. In terms of vertical domain applications, Wang ^[6] applied BERT and attention mechanism to sentiment analysis of ceramic e-commerce product reviews, verifying the adaptability of the model in segmented fields. Zhang et al. ^[7] realized dual-BERT directed sentiment text classification based on attention mechanism, enhancing the model's ability to capture sentiment tendencies. Chen ^[8] employed BERT encoding and attention mechanism to accomplish long text classification, providing a solution for processing long-sequence comment texts. Wu and Hui ^[9,10] applied the model to book recommendation and aspect-level sentiment analysis respectively, further expanding the technical system of fine-grained semantic understanding and information screening. Although existing studies have covered general text, e-commerce reviews, sentiment classification and other fields, specific research on the effectiveness identification of novel reader reviews remains scarce. Current outcomes lack both unified criteria for defining effective information and a specialized technical framework adapted to the scenario of novel reviews. Accordingly, this paper sorts out the evolution and application status of relevant technologies, analyzes the definition logic and identification difficulties of effective information in novel reviews, and explores the adaptation bottlenecks of technologies in this scenario, aiming to fill the research gap in this segmented field and provide a theoretical reference for effective information filtering of online literature reviews and industrial content governance.

2. RELATED WORK

With the continuous development of natural language processing (NLP), deep learning methods have achieved remarkable results in text classification, information filtering and quality evaluation due to their strong contextual semantic understanding, automatic feature extraction and adaptability to complex texts. At present, such technologies have been widely used in e-commerce review usefulness judgment, social media public opinion analysis and product feedback

evaluation. They effectively overcome the drawbacks of traditional methods relying on manual features and insufficient semantic capture, greatly improve the efficiency and accuracy of text processing, and provide reliable support for intelligent review analysis.

Although review analysis in general fields has become relatively mature with a complete technical system, research on the effectiveness identification of novel reader reviews is still insufficient. Different from e-commerce and social comments, novel reviews have unique features such as strong narrative relevance, rich subjective expression and close connection with plots and characters, which existing general models cannot well adapt to. In addition, there is no unified standard for effective reviews or a dedicated framework for novel review scenarios, leading to low accuracy and weak generalization in practical applications. Therefore, constructing a more targeted identification method based on the characteristics of novel reviews to fill the research gap is of great significance and practical value.

3. RESEARCH FRAMEWORK OF NOVEL REVIEW EFFECTIVENESS IDENTIFICATION BASED ON BERT-ATTENTION MECHANISM

This chapter focuses on the application of the BERT-attention mechanism in the effectiveness identification of online novel reader reviews, and systematically sorts out the research context, current progress, existing problems, development opportunities, challenges and feasible optimization paths of this technology in the segmented field of online literature, so as to provide solid theoretical support and clear research ideas for subsequent related research.

3.1 Application Status of BERT-Attention Mechanism in Novel Review Identification

3.1.1 Core Advantages of the Model and Scenario Adaptation Foundation

With the rapid development of generative AI and the continuous prosperity of the online literature industry, the number of novel reader reviews has shown explosive growth. Such reviews are characterized by strong colloquialism, rich emotional expression, high narrative relevance and diverse expression forms, which bring great difficulties to effective information extraction and quality evaluation. Meanwhile, the lack of unified and standardized criteria for review effectiveness has become a prominent problem restricting the content governance of literature platforms. As a mainstream technical solution in the field of natural language processing, the BERT-attention mechanism fully integrates the powerful bidirectional semantic modeling capability of BERT and the dynamic information focusing capability of the attention mechanism. Relying on the Transformer architecture, BERT can generate deep contextual representations, effectively capture long-distance semantic dependencies, and significantly improve the understanding accuracy of complex texts. The attention mechanism can automatically assign weights to different parts of the text, strengthen the extraction of key information, and suppress the interference of redundant content, showing excellent performance in fine-grained text analysis tasks. The combination of the two modules performs better than traditional deep learning models such as Convolutional Neural Network (CNN) and LSTM in multiple tasks including sentiment analysis, opinion extraction and review usefulness detection, and has been successfully applied in practical scenarios such as e-commerce reviews and social media comment analysis. It has strong adaptability to unstructured, colloquial and emotional texts, and has broad potential for domain migration, which lays a reliable technical foundation for the effectiveness identification of novel reviews.

3.1.2 Existing Deficiencies of the Model Applied to Novel Review Identification

At present, most models adopt a general-purpose text analysis structure without special design for the unique characteristics of novel reviews, so they cannot fully understand the plot logic, character relationships, thematic connotation and cross-sentence semantic connections in novel-related comments. The standard attention mechanism pays more attention to local word associations and lacks a special weight allocation mechanism for effective evaluation information, making it difficult to accurately distinguish high-quality comments from invalid content such as spam and irrelevant chats. More importantly, the academic circle has not yet formed a unified definition standard for the effectiveness of novel reviews, resulting in unclear training objectives and insufficient scenario adaptation of the model, which has become the core bottleneck restricting the practical application of the technology.

3.1.3 Definition Standard of Effective Information for Novel Reviews

Combined with the narrative, subjective and scenario-bound characteristics of novel reviews, this paper constructs a set of effective information definition standards from three core dimensions: value, relevance and objectivity. Value requires reviews to include specific reading perceptions and constructive viewpoints to provide reference for readers, authors and platforms. Relevance means that comment content must be closely connected with the novel's plots, characters, themes

and other core elements, excluding irrelevant information. Objectivity emphasizes that emotional expression should be based on the text content rather than unfounded evaluation. The three dimensions complement each other to form a complete and operable judgment basis, which makes up for the defects of existing models and provides clear guidance for model optimization and training.

3.2 Opportunities and Challenges of Applying BERT-Attention Mechanism to Novel Review Identification

3.2.1 Application Opportunities

The application of the BERT-attention mechanism in novel review effectiveness identification faces important development opportunities. Technically, novel reviews rely heavily on contextual logic and narrative coherence, and the global semantic modeling ability of BERT and the targeted focusing ability of the attention mechanism can accurately capture key information such as plot evaluation, character analysis and thematic perception, which is highly consistent with the technical needs of novel review analysis. In terms of industrial demand, online literature platforms have massive comment data with high redundancy and low information density. Manual review is costly, inefficient and difficult to scale, so intelligent and automatic screening technology is urgently needed. In addition, the continuous iteration of lightweight BERT models and multi-branch attention structures reduces the difficulty of model deployment and improves engineering practicability. Carrying out research in this field can fill the technical gap in the segmented scenario of online literature, expand the application scope of pre-trained language models, and have important theoretical significance and practical application value.

3.2.2 Application Challenges

The model still faces multiple challenges in practical application. General-purpose models lack narrative perception ability and cannot fully understand the internal logical relationship and character settings of novels, which easily leads to misjudgment and omission of effective reviews. Novel reviews are mostly long texts with implicit emotional expression, and the standard attention mechanism is insufficient in capturing cross-sentence and cross-paragraph semantic dependencies, resulting in incomplete deep semantic understanding. There are obvious differences in the content and focus of reviews of different novel types, and a single model structure has limited generalization ability and is difficult to adapt to diversified themes. More importantly, there is a lack of a unified effectiveness labeling system and a large-scale high-quality dedicated corpus in the academic community, resulting in the lack of standardized data support for model training and verification, which seriously restricts the further optimization and large-scale promotion of the technology.

3.3 Optimization Paths of BERT-Attention Mechanism in Novel Review Identification

3.3.1 Model Structure Optimization

According to the textual characteristics of novel reviews, a hierarchical attention mechanism can be introduced to conduct semantic modeling at the word level, sentence level and text level, so as to enhance the model's ability to capture long-text features and cross-sentence logical connections. On this basis, multi-branch attention modules for plot, character and theme can be added to enable the model to automatically focus on information highly related to effectiveness and reduce the interference of redundant content. Through multi-module feature fusion, the general-purpose semantic recognition model is transformed into a special model for novel review analysis, and the recognition accuracy and scenario robustness are further improved by optimizing the attention weight allocation strategy.

3.3.2 Scenario-Based Training and Application Optimization

At the training level, large-scale novel review corpus can be used to carry out domain adaptive pre-training and incremental fine-tuning on the BERT model to enhance its adaptability to the colloquial, narrative and networked expression habits of online literature comments. Meanwhile, a standardized labeling system is constructed based on the three-dimensional effectiveness standard to provide clear and consistent training objectives for the model. At the application level, a genre-adaptive attention strategy can be designed to dynamically adjust the weight distribution according to the characteristics of different types of novels, so as to improve the generalization ability of the model. Combined with knowledge distillation and model compression technologies, the model can be deployed in a lightweight way, reducing computing resource consumption and deployment costs while maintaining recognition accuracy, so as to promote the practical landing and wide application of the technology in real online literature platforms.

4. CONCLUSIONS

This paper systematically reviews the application of the BERT-attention mechanism in the effectiveness identification of novel reader reviews, and summarizes the technical advantages, scenario adaptation foundation, existing deficiencies, development opportunities and challenges of the model, as well as targeted optimization paths. Studies show that the BERT-attention mechanism provides feasible technical support for the effectiveness identification of novel reviews by virtue of its strong contextual semantic modeling and key information focusing capabilities, and has significant application potential in the intelligent analysis of online literature reviews. However, current general-purpose models cannot fully adapt to the narrative nature, long-text dependence and subjective expression characteristics of novel texts. In addition, the lack of unified definition standards for review effectiveness and high-quality dedicated corpora in the industry leads to insufficient recognition accuracy and limited generalization ability of the models in practical scenarios. Therefore, this paper clarifies the judgment criteria for effective novel reviews from three dimensions: value, relevance and objectivity, and proposes optimization directions including hierarchical attention enhancement, multi-branch feature fusion, domain-adaptive pre-training and genre-adaptive strategies. Future research can be further promoted around the construction of dedicated corpora for novel reviews, the improvement of effectiveness standard systems, and the design of lightweight scenario-based models, so as to further enhance the practicality and implementation of the BERT-attention mechanism in online literature review governance and intelligent mining, and provide a more reliable technical solution for content management, reader experience optimization and creative reference of online literature platforms.

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